

Minnesota Ground Water Association

www.mgwa.org

Newsletter

March 2017
Volume 36, Number 1

Featured:

- ◆ MGS Preliminary Maps for St. Louis and Lake Counties, page 1
- ◆ Anoka, Nicollet, and Sibley Part B Atlases, page 5
- ◆ First Field Camp Scholarship Offered, page 9



MGWA President
Evan Christianson

Inside:

President's Letter	1
Member News	2
MGWA News	3
Abbreviations and Acronyms	4
Agency News	4
HVSR passive seismic method	8
New Publication	9
MGWA/MGWAF Minutes . . .	10

President's Letter

As I step into the role of MGWA Board President, it is humbling to follow so many who have helped this organization become what it is today. After 35 years MGWA remains strong and vibrant. The future of our organization is bright. New initiatives over the last several years such as the white papers and the growth of the MGWA foundation and its support for groundwater education have been great successes. In the coming year you can expect to see a revamp of our webpage and a push to make the conferences even more interactive and engaging.

We welcome Ellen Considine as the new President-Elect and Anneka Munsell as the new Treasurer. The board will miss the leadership of our outgoing Past-President Lanya Ross and the dedication of Treasurer Emily Berquist. However, I'm happy to announce that while Emily will no longer be tracking the associa-

tion's finances she will continue her enthusiasm for helping all of our members network by continuing to organize happy-hour events and establishing MGWA's presence on social media.

Having worked on hydrogeology projects in many states I am always reminded how fortunate we are. By most standards, Minnesota has excellent groundwater data sources and dedicated organizations and professionals that work tirelessly to maintain these data. Imagine getting up to speed on the hydrogeology of a new and unfamiliar project site. A quick query of databases such as the Minnesota Well Index (MWI), MNDNR Permitting and Reporting System (MPARS), Cooperative Groundwater Monitoring (CGM), and Environmental Data Access (EDA) give you access to raw geology,

— continued on page 3

Minnesota Geological Survey Preliminary Maps for St. Louis and Lake Counties

By Mark Jirsa

The Minnesota Geological Survey has just released preliminary bedrock and surficial geologic maps that cover portions of Lake and St. Louis Counties in northeastern Minnesota. The maps include areas under consideration for Cu-Ni mining, and the easternmost extent of the Mesabi Iron Range. These are the first in a series of 3 bedrock and 4 surficial geologic maps that collectively will provide data and interpretations for County Geologic Atlases of the two counties. Reference to pdfs and associated GIS files via the MGS website or this link: <http://hdl.handle.net/11299/183258>

The maps were prepared and published with the support of the Minnesota Environment and Natural Resources Trust Fund as recommended by the Legislative-Citizen Commission on

Minnesota Resources; the U.S. Geological Survey STATEMAP program; and the St. Louis and Lake County Boards of Commissioners.

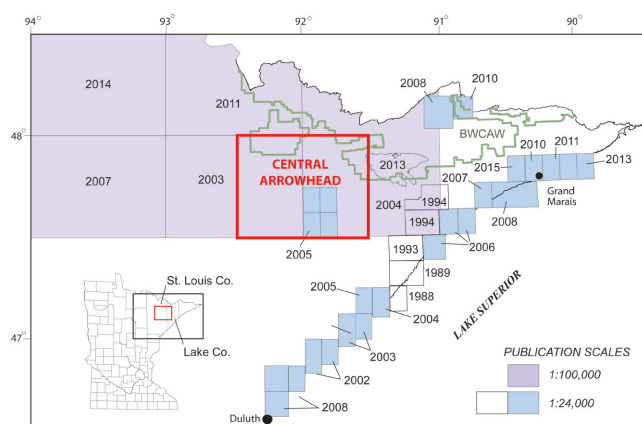


Figure 1. Map of northeastern Minnesota showing the location of the Central Arrowhead area in the context of published geologic maps funded in large part by programs of the USGS. Boundary Waters Canoe Area Wilderness (BWCAW) border is green. Inset map of the state shows county boundaries.

MGWA Newsletter Team

Editor-in-Chief

Tedd Ronning
current issue editor
Xcel Energy
tedd.a.ronning@xcelenergy.com

Sherri Kroening

Minnesota Pollution Control Agency
sharon.kroening@state.mn.us

Joy Loughry

Minnesota DNR
joy.loughry@state.mn.us

Andrew Streitz

Minnesota Pollution Control Agency
andrew.streitz@state.mn.us

Eric Tollefsrud

Geosyntec Consultants
ETollefsrud@geosyntec.com

Ruth MacDonald

Minnesota DNR
ruth.macdonald@state.mn.us

Advertising Manager

Jim Aiken

Barr Engineering Co.
(952)832-2740
jaiken@barr.com

MGWA Management

WRI Association Mgmt Co.
(651)705-6464
office@mgwa.org

MGWA Web Page

Visit www.mgwa.org for MGWA information between newsletters and to conduct membership and conference transactions.

Newsletter Deadlines

Issue	Due to Editor
June '17	05/05/2017
September '17	08/04/2017
December '17	11/04/2017
March '18	02/02/2018

© Minnesota Ground Water Association. ISSN: 1098-0504

Material in this publication may be reprinted if appropriate credit is given. Views expressed in this publication do not reflect official MGWA policy unless expressly stated as such.

MEMBER NEWS

Todd Petersen Promotion

Todd Petersen has been promoted to the new position of Hydrogeology Data Manager at the DNR, Ecological and Water Resources Division. He is now the business lead for enterprise data systems used by the Hydrogeology and Groundwater Unit. This includes the primary responsibility for data governance for the Hydrogeology and Groundwater Unit, including County Geologic Atlas databases,

the statewide spring inventory database, and the new aquifer test database.

Todd also has a lead role in data coordination and integration with other state agencies and the Minnesota Geological Survey. He will continue to be the lead geophysicist for the Ecological and Water Resources Division and to provide support and mentoring to the County Geologic Atlas Program and Staff.

Kurt Schroeder Retirement

After nearly 30 years of state service with the MN Pollution Control Agency, Kurt is heading for the hills of North Carolina and retirement. Kurt worked as a hydrogeologist in water supply, solid waste, wastewater and Superfund. He'll miss working on his favorite Superfund site, Baytown. Fifteen years of work on the project produced a promising source remedy and over 330 wells on granular activated carbon filters. He also enjoyed working on the MGWA newsletter team for over five years in the 2000s with many past and current MGWA luminaries.

Kurt plans to enjoy the timeless Blue Ridge Mountains with time for music, hiking, biking and working on his tennis game with his partner, Jane. Otherwise he may be seen riding the LaZoom bus through the streets of Asheville.



Ellen Considine Promoted at DNR

Ellen Considine is now the Hydrologist Supervisor of the Groundwater Technical Analysis Program at the Minnesota DNR. She has been at the DNR since September of 2015, where she started as a Groundwater Specialist in the same unit. She previously worked at Barr Engineering Company for 9 years as a Hydrogeologist. She has a Master's degree in Hydrogeology at the University of Nevada, Reno. Her bachelor's degree is in Geological Engineering from UW-Madison.



LABORATORIES, Inc.

P.O. Box 249
NEW ULM, MN 56073-0249

Independent laboratory services, specializing in testing of groundwater, soil, hazardous wastes, sludges and drinking water.

On site sampling services available

Call: (800-782-3557)

Association Officer Announcements

Ellen Considine is the President-Elect of the MGWA for 2017. Ellen is Supervisor of the Groundwater Technical Analysis Unit at the Minnesota DNR. Anneka Munsell is the new MGWA Treasurer. Anneka is a Project Engineer with WSB & Associates, Inc.

The Association would like to recognize and thank outgoing President Ole Olemanson and outgoing Treasurer Emily Berquist. As Past President, Ole will serve on the MGWA Foundation Board as the MGWA Liaison.

Please congratulate and thank the new and outgoing officers. The MGWA could not exist without their service!



President's Letter, cont.

pumping, water level, and water quality data that can quickly be processed. The information distilled in the county atlases is incredible. What were once just maps are now so much more and include supporting digital datasets that can be utilized in new and exciting ways. With all this information easily accessible, conceptual cross-sections, piezometric surfaces, and in some instances simple groundwater models can often be developed in a matter of hours. These tasks conducted in many states can take days, and often are actually impossible. Many times the data simply don't exist, or more appropriately, were lost because no one had the foresight to maintain quality records. I'm not an economist, but it's easy to figure that the cost of maintaining these publicly available datasets is dwarfed by the cumulative savings enjoyed by all of us.

While we can stand proud that Minnesota's groundwater datasets are ahead of many states there is always room for improvement. The way we share and process data is always changing. Many of the agencies in charge of maintaining Minnesota's groundwater data have been working to improve access, quality, and the quantity of data. New data processing and computational methods help shed light onto our conceptualizations and push us

to new understandings. The MGWA spring conference will focus on data, both big and small. We will discuss what new data are available and what's being done to make them more accessible. We will also explore new interpretation and computational methods and how these methods can be leveraged to optimize the collection of new data to fill in gaps when working with limited resources. I look forward to discussion of these topics and many more on April 26th. I hope to see you there!



2017 MGWA Board

Past President
Ole Olemanson
Shakopee Dakota
(952)233-4238
ole.olemanson@shakopeedakota.org

President
Evan Christianson
Barr Engineering Company
(952)832-2957
echristianson@barr.com

President-Elect
Ellen Considine
MN DNR EWR
(651)259-5671
ellen.considine@state.mn.us

Secretary/Membership
Andrew Retzler
Minnesota Geological Survey
(612)626-3895
aretzler@umn.edu

Treasurer
Anneka Munsell
WSB & Associates
(763)541-4800
amunsell@wsbeng.com

The primary objectives of the MGWA are:

- ◆ Promote and encourage scientific and public policy aspects of groundwater as an information provider.
- ◆ Protect public health and safety through continuing education for groundwater professionals;
- ◆ Establish a common forum for scientists, engineers, planners, educators, attorneys, and other persons concerned with groundwater;
- ◆ Educate the general public regarding groundwater resources; and
- ◆ Disseminate information on groundwater.

MGWA's Corporate Members

Braun Intertec

Rochester Public Utilities

Respec

Barr Engineering

NTS

Links at www.mgwa.org

Abbreviations and Acronyms

- ◆ ASTM – American Society for Testing and Materials
- ◆ DNR – Minnesota Department of Natural Resources
- ◆ MDA – Minnesota Department of Agriculture
- ◆ MDH – Minnesota Department of Health
- ◆ MGS – Minnesota Geological Survey
- ◆ MPCA – Minnesota Pollution Control Agency
- ◆ USEPA or EPA – United States Environmental Protection Agency
- ◆ USGS – United States Geological Survey

AGENCY NEWS

DNR Adopts New Logo

By MGWA Newsletter Team

DNR updated its logo on December 15, 2016 per Governor Dayton's new logo and branding initiative. The Governor's Office initiated this new logo and branding effort because he sees state government as an enterprise working on behalf of all Minnesotans. He believes a unified state brand will help people identify all state agencies as part of that enterprise and help us attract new businesses to the state and new talented state employees.

DNR is in a first group of state agencies to make the switch and eventually all state agencies will carry the new logo. To see why this is an important move for the State of Minnesota, take a look at this video created by MNIT on brands.

<https://youtu.be/KxqEANss-Tc>



Report Springs with the Minnesota Spring Inventory App

By Ruth MacDonald, DNR

We now know about only 3,000 of an estimated 22,000 springs statewide. A new app will give DNR groundwater researchers valuable information about the locations of more springs across Minnesota. The new citizen app makes everyone a potential spring hunter.

Anyone can add to the inventory using the Minnesota Spring Inventory Reporting App from their home computer or mobile device, using map location or aerial imagery. Find the app, how to use it, a spring map, contacts, and information about springs at mndnr.gov/MnSpringInventory.

Spring locations will appear on the Spring Inventory Map after verification by the DNR. Winter is the best season for mapping springs, as they leave telltale melt spots in the snow and there are no leaves to obstruct the view.

Springs create and sustain vital ecosystems, can indicate ground water health and help protect against invasive species. Land stability and building integrity depend on knowing where springs are located. Trout streams and other coldwater fisheries, calcareous fens, and many streams and lakes all require springs. Help DNR research by using the app and encourage others to join the hunt for springs.

2. Select Location

Please pinpoint the spring location: zoom in, click on the map, then drag the pointer to the exact location.

Latitude: 46.36388, Longitude: -94.26200



DNR County Geologic Atlas Program Publishes Anoka, Nicollet, and Sibley Part B (Hydrogeology) Atlases

Geology makes a difference

By Vanessa Baratta and Jim Berg,
Minnesota Department of Natural Resources

In the December 2016 MGWA newsletter Dale Setterholm of the Minnesota Geological Survey reported on their acceleration of Part A County Geologic Atlas (CGA) production. A similar acceleration of Part B has been happening at the DNR during the past couple years, along with the addition of a new booklet format. In the summer of 2016 the Blue Earth CGA and statewide Minnesota Hydrogeology Atlas series were published; in the past few months the Anoka, Nicollet, and Sibley CGA's were completed. In the coming year we expect to publish Part B atlases for Sherburne, Renville, Wright, and Clay counties.

As multiple Part B atlases are produced side by side, interesting comparisons emerge, such as how the geologic settings affect pollution sensitivity—not only in shallow settings but all the way through interconnected buried sand and gravel aquifers to the top of the underlying bedrock. The recently published counties are examples of this contrast: the east-central county of Anoka and the south-central counties of Nicollet and Sibley.

Anoka County

Anoka County is located in east central Minnesota. The southern and southwestern parts of the county are characterized by relatively high density urban and suburban settings and land use. The remainder of the county is mostly low density rural and small communities. The topography is flat to rolling in most of the county with the exception of the hilly northwestern corner of the county, and the southernmost Columbia Heights area.

The Mississippi River forms more than half of the western border and drains the western and southern parts of the county. The county lies within the watersheds of the Mississippi, Rum, and Lower St. Croix rivers. These rivers are the dominant groundwater discharge locations and control the groundwater flow in the water-table aquifer. Potentiometric surface maps of buried aquifers show a general pattern of groundwater flow toward the Mississippi River valley in the western half of the county and flow toward the St. Croix River in the east and northeast.

The county is located in an extensive complex of surficial sand that characterizes counties north of the Twin Cities Metro area (Anoka sand plain, Figure 1). This is in turn part of an even larger area of generally sandy surficial conditions covering central Minnesota.

— continued on page 6

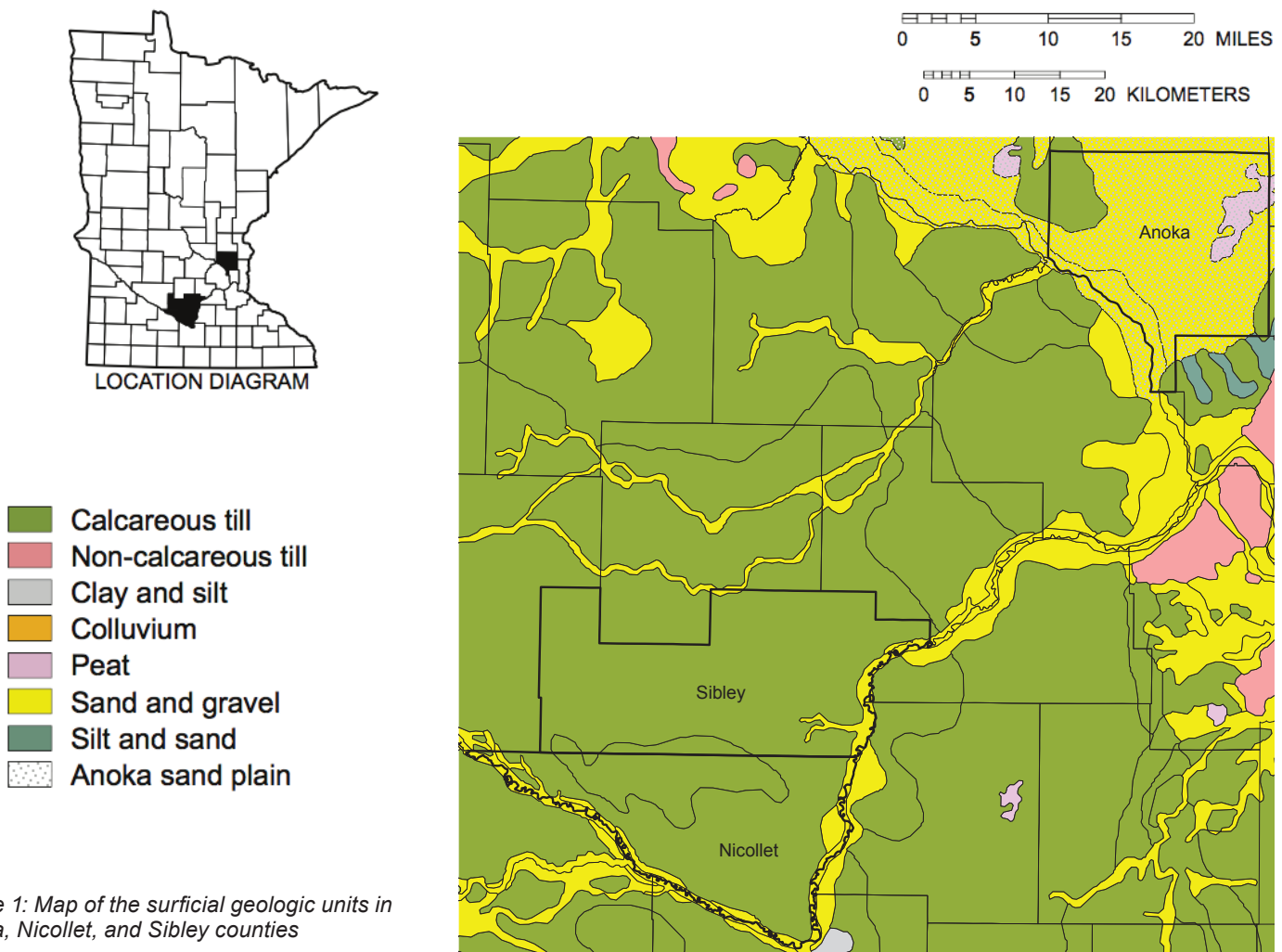


Figure 1: Map of the surficial geologic units in Anoka, Nicollet, and Sibley counties

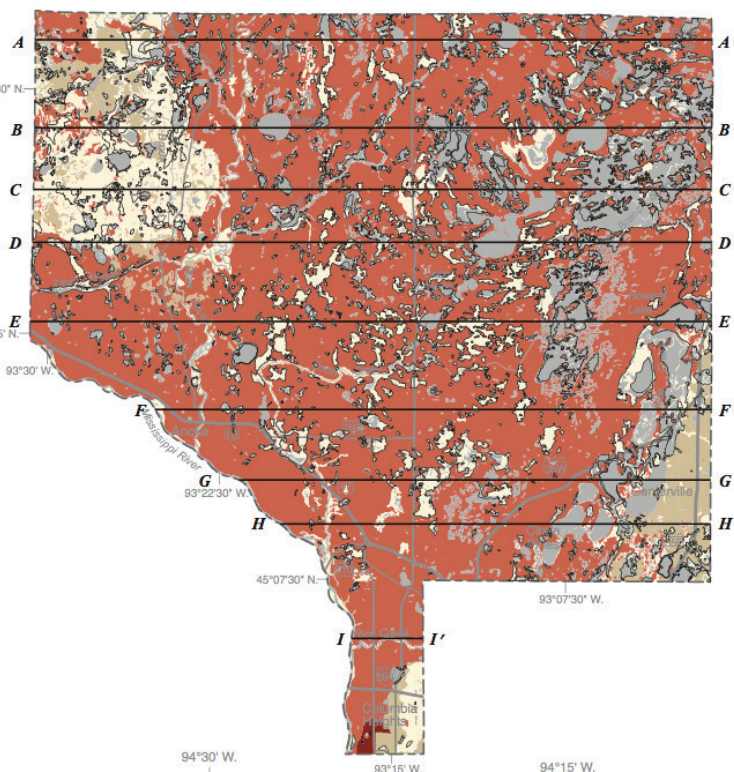
Anoka, Nicollet, and Sibley Part B Atlases, cont.

This sand plain setting contributes to the overall high pollution sensitivity of the area: very high for the near-surface (Figure 2) and elevated all the way to local areas at the bedrock surface (Figure 3).

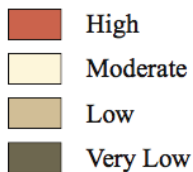
The high sensitivity ratings are consistent with the relatively high proportion of groundwater samples with elevated chemicals of anthropogenic origin, such as chloride and nitrates. Anthropogenic chloride is a significant and widespread contaminant in Anoka County, with elevated occurrences found in 34 percent of the samples. These are generally sourced from road salt and water softener salt. Elevated nitrate concentrations were detected in the western portion of the county in 5 percent of the total groundwater samples, with concentrations that exceeded an approximate background concentration of 1 ppm. The combined data indicate abundant pathways for surface water recharge to shallow buried sand aquifers.

Naturally occurring chemicals of concern in the county included arsenic and manganese. Arsenic was found in elevated concentrations (>10 ppb) in 11 percent of the groundwater samples, with the majority being from bedrock aquifers. Statewide, 11 percent of new wells constructed from 2008 to 2015 had arsenic concentrations exceeding 10 ppb (MDH, 2016). Manganese values greater than the Minnesota Department of Health Risk Limit for infants (100 ppb) were found in 68 percent of the groundwater samples, indicating a natural water quality issue for the majority of well owners in the county.

— continued on page 7



Estimated vertical travel time through near-surface materials



Special conditions

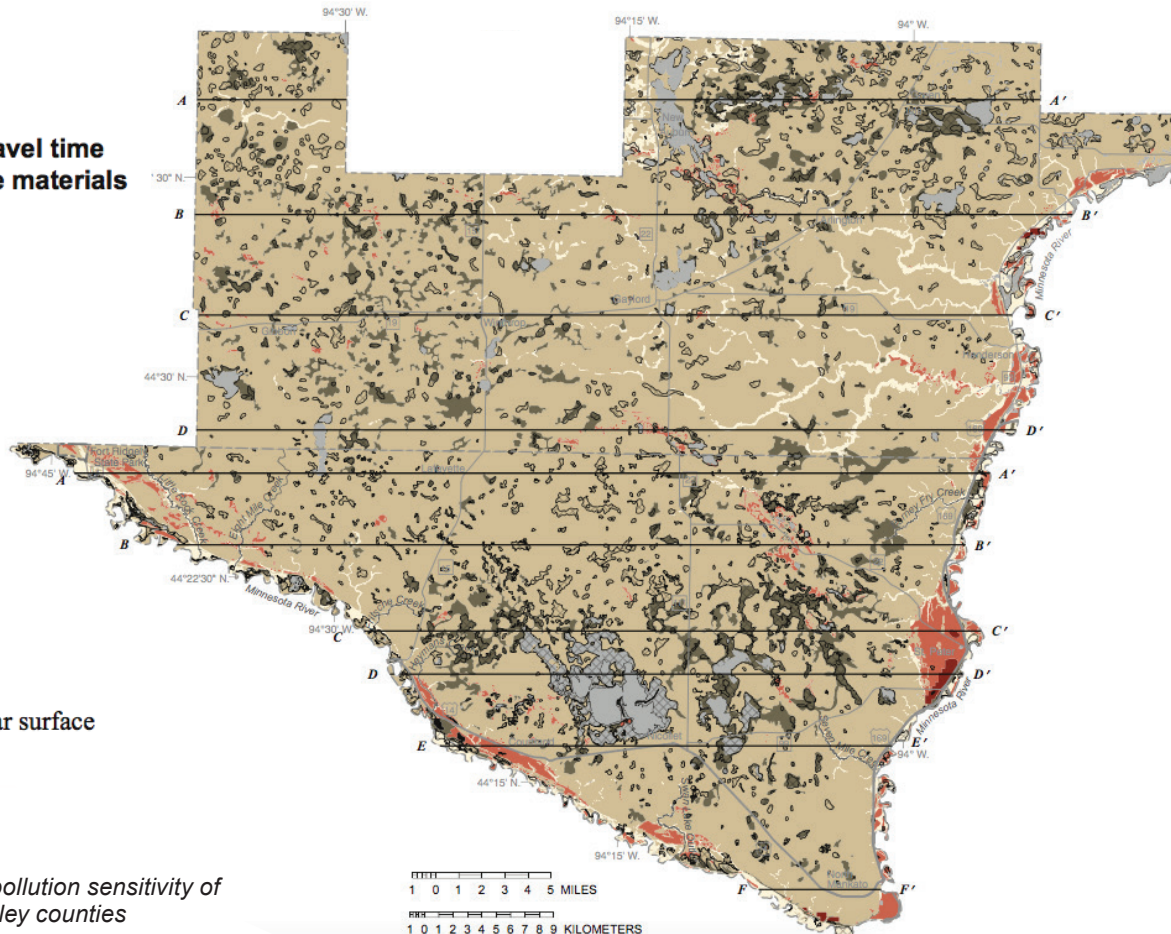
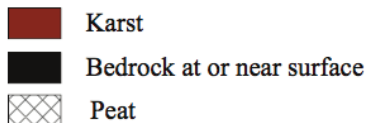


Figure 2: Near surface pollution sensitivity of Anoka, Nicollet, and Sibley counties

Nicollet and Sibley counties

Nicollet and Sibley counties are located in the rural areas of south-central Minnesota. The topography is mostly flat to rolling, except along the eastern borders where the Minnesota River is deeply incised into the surface creating river gorges and wooded bluffs. The Minnesota River completes the southern border of Nicollet. Groundwater generally flows toward the Minnesota River and locally toward smaller rivers, as evident on the water table maps. All of the buried sand and gravel and bedrock aquifers also show groundwater flowing toward the Minnesota River.

In contrast to the abundance of sand in Anoka County, Nicollet and Sibley counties have mostly till at the surface (Figure 1). The fine-grained materials at the surface in these counties slow down infiltration, lowering the pollution sensitivity. Consequently, the pollution sensitivity across the counties is low from the near surface (Figure 2) all the way down to the bedrock surface (Figure 3). The exception is the Minnesota River valley, where the presence of sand and shallower bedrock cause sensitivity to be very high.

Chemicals that can have an anthropogenic origin are less common due to the lower sensitivity trend. Elevated anthropogenic chloride (greater than 5 ppm) is only present in 6 percent of the groundwater samples. Nitrate (greater than 1 ppm) was found in less than 5 percent of the samples.

Naturally occurring chemicals of concern were detected in samples with arsenic that exceed 10 ppb in Nicollet (17 percent) and Sibley (37 percent) water samples. These percentages were higher than Anoka County. This may be due to a higher amount of shale particles with an elevated arsenic content in the till units. Manganese values greater than Minnesota Department of Health Risk Limit for infants (100 ppb) were present

in greater than 58 percent of the samples in each of the counties. This indicates a natural water quality issue for the majority of well owners.

More detailed information about groundwater flow, water chemistry, and pollution sensitivity in each of these counties can be found in their respective county geologic atlas Part B. Web locations and authors are listed below:

Anoka County Geologic Atlas, Part B: http://www.dnr.state.mn.us/waters/programs/gw_section/mapping/platesum/anokcga.html

Jim A. Berg (DNR), jim.a.berg@state.mn.us

Nicollet County Geologic Atlas, Part B http://www.dnr.state.mn.us/waters/programs/gw_section/mapping/platesum/nicocga.html

Vanessa Baratta (DNR), Vanessa.Baratta@state.mn.us

Sibley County Geologic Atlas, Part B: http://www.dnr.state.mn.us/waters/programs/gw_section/mapping/platesum/siblcga.html

Vanessa Baratta (DNR), Vanessa.Baratta@state.mn.us

Pollution sensitivity rating

Estimated vertical travel time for water-borne contaminants to enter an aquifer (pollution sensitivity target)

- Very High
- High
- Moderate
- Low
- Very Low

Tritium age

Symbol color indicates tritium age of water sample.

- Recent
- Mixed
- Vintage
- Not sampled for tritium.

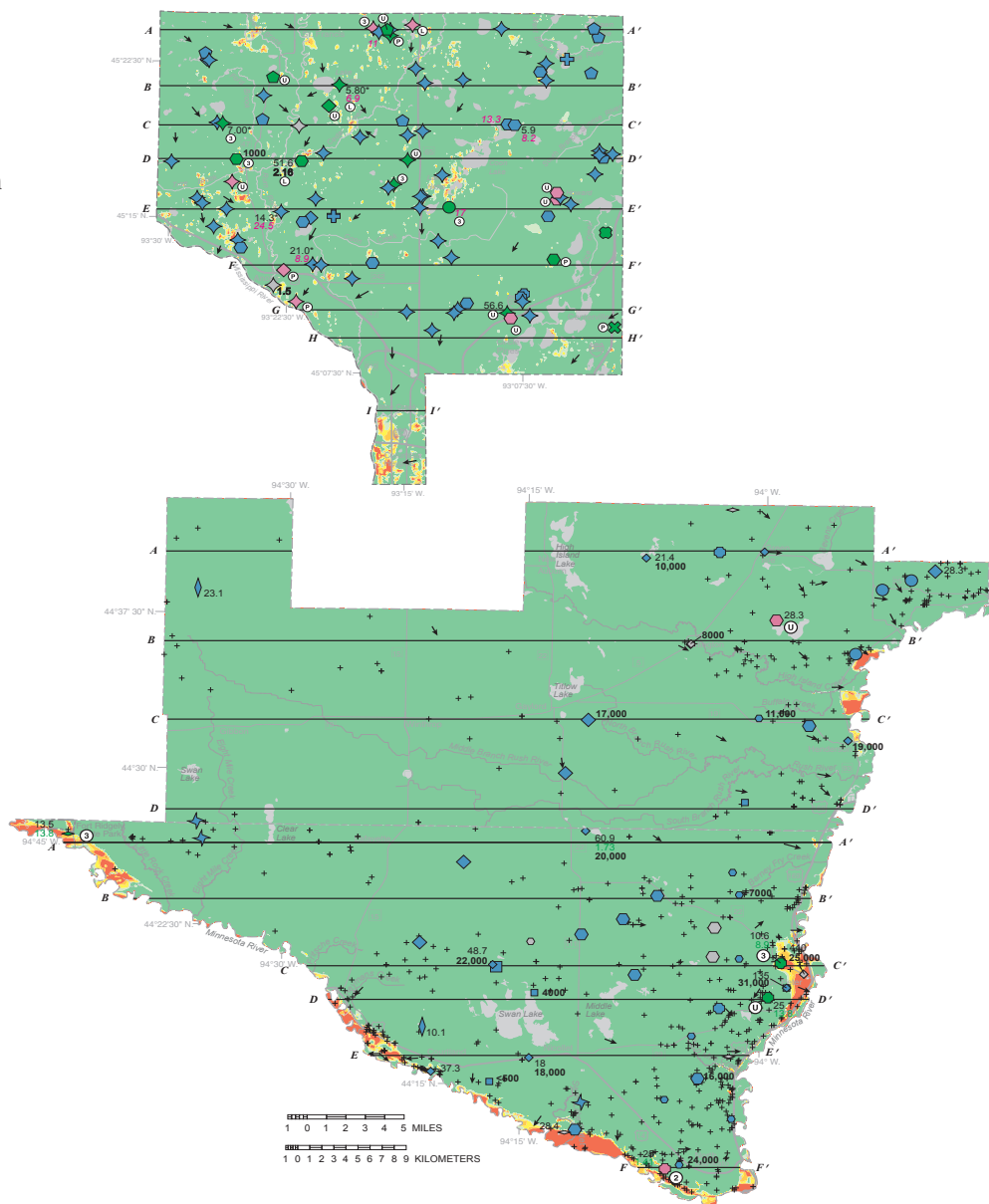


Figure 3: Pollution sensitivity of the bedrock surface in Anoka, Nicollet, and Sibley counties

Using the Horizontal-to-Vertical Spectral Ratio (HVSr) Passive Seismic Method to Estimate Quaternary Sediment Thickness in Minnesota

Val W. Chandler, chand004@umn.edu

The Quaternary sequence is an important source of groundwater in Minnesota, but in many areas the thickness of these sediments is very poorly known, due to inadequate well control. Since 2010 the Minnesota Geological Survey has been collecting horizontal-to-vertical spectral ratio (HVSr) passive seismic data to help estimate the thickness of Quaternary sediments in Minnesota. The method is based on the ability of instruments to measure the resonant frequency of shear waves that are trapped within loose sediments overlying rigid bedrock. The primary resonant frequency of the sediment package ideally corresponds to a prominent peak in the HVSr spectra. The relationship between resonant frequency and sediment thickness (depth to bedrock) is calibrated using HVSr results from wells where the thicknesses of Quaternary sediments are known to develop a depth vs frequency plot. The calibration curve can then be used to estimate thickness from measurements at points without control. As of January 1, 2017, over 2900 HVSr measurements have been acquired in Minnesota, encompassing a wide variety of bedrock and sediment conditions. Some generalized calibrations have been derived, along with area-specific calibrations that improve estimates locally. Analysis of the HVSr calibration results indicate that estimates of Quaternary thickness are usually within 25% error and often

less, which is adequate for most geological applications.

The HVSr method must be used with appropriate caution; the HVSr signature of the sediment- bedrock interface can be obscured or distorted by a variety of conditions, including irregular bedrock surfaces, low-velocity bedrock (such as saprolite or Cretaceous strata), and large variations in shear-wave velocity within the sediments. In spite of these limitations, the HVSr method has been a very useful supplement to MGS investigations of bedrock depth

and topography, particularly those that are part of the County Geologic Atlas program. Although the HVSr method does not match conventional seismic studies in the level of interpretive detail, it has the distinct advantages of rapid data collection, much lower equipment and staff costs, ease of data analysis, and a large number of samples that can be collected within any area. The HVSr method can also be readily applied where there is significant cultural noise and conventional seismic data is difficult or impossible to obtain. Publications describing the use of the HVSr method in Minnesota include a paper in the journal Interpretation (<http://library.seg.org/doi/abs/10.1190/INT-2015-0212.1>) and an open file report published by the MGS (<http://conservancy.umn.edu/handle/11299/162792>). Most of the HVSr research and data acquisition described here was funded through the Environment and Natural Resource Trust Fund as recommended by the Legislative and Citizen's Commission on Minnesota Resources (LCCMR).

What Kind of Science Do You Need?

Groundwater and Waste Water Testing | Phase 1 & 2 ESA's

Water Resource Planning | Soil, Water, and Vapor Sampling

Industrial Hygiene | Hazardous Materials Inspections

BRAUN
INTERTEC

The Science You Build On.

952.995.2000 | braunintertec.com

New Minnesota Water Science Center Report

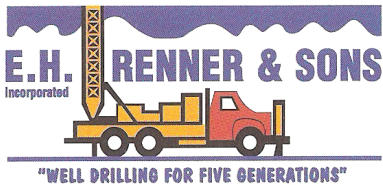
Water-Level Changes in Northeast Twin Cities Lakes Vary with Landscape Setting

The first chapter of a two-chapter report on lake-level fluctuation in the northeast Twin Cities Metropolitan area presents results from statistical analyses of lake-level fluctuations, and also presents interpretations of new field data on surface water-groundwater interactions in the study area. A summary of this report is in our news release. The full chapter is available online.

Contact: Perry Jones, pmjones@usgs.gov.

ROGER E. RENNER
President

(763) 427-6100
Mobile: (763) 286-9355
Fax: (763) 427-0533



NGWA Certified Master Ground Water Contractor

15688 Jarvis St. NW
Elk River, MN 55330

rerenner@ehrenner.com
www.ehrenner.com

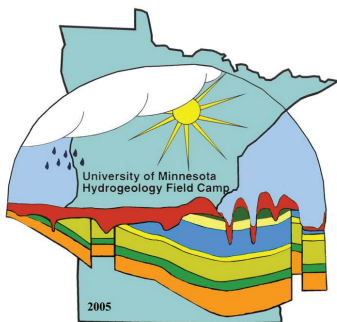
MGWA Foundation offers Hydrogeology Field Camp Support

The MGWA Foundation is excited to offer support for hydrogeology field camp participants for the first time.

For the summer of 2017 two \$1,500 awards are being offered to help defray the cost of course fees and/or travel expenses at a hydrogeology field camp in Minnesota or adjacent states/provinces.

The deadline is April 30, 2017 and the application is available at: www.mgwa.org/mgwa-foundation/hop-award/

We welcome donations to the MGWA Foundation so we can continue to offer student scholarships and hydrogeology field camp awards.



Above - Action at the University of Minnesota Hydrogeology Field Camp; Below - Action at the Western Michigan Hydrogeology Field Course



MGWA Foundation Board of Directors

President
Scott Alexander
University of Minnesota
(612)626-4164
alexa017@umn.edu

Secretary
Vacant

Treasurer
Cathy von Euw
Stantec
(651)255-3963
cathy.voneuw@stantec.com

MGWA Liaison
Ole Olemanson
Shakopee Dakota
(952)233-4238
ole.olemanson@shakopeedakota.org

Director
Lanya Ross
Metropolitan Council
(651)602-1803
layanaross@metc.state.mn.us

Director
Stu Grubb
Northeast Technical Services
(651)351-1614
grubbss@aol.com

Director
Eric Mohring
Board of Water and Soil
Resources
(651)297-7360
eric.mohring@state.mn.us

Director
Stephanie Souter
Washington County Public Health
& Environment
651-430-6701
stephanie.souter@co.washington.mn.us

**The MGWA Foundation
is a 501(c)3 charitable
organization. Donations
to the Foundation are
deductible on your state
and federal income tax
returns.**

MGWAF BOARD MINUTES

Meeting Date December 6, 2016

Attending: Members: Scott Alexander, Cathy von Euw, Eric Mohring, Stu Grubb, Stephanie Souter, and Lanya Ross; Others: Sean Hunt and Jennie Leete, MGWA Management.

Current Business: September 2016 meeting minutes. The blanket statement that there were no credits/debits was not accurate. There were no credits/debits to the MGWAF but there were credits to the H.O. Pfannkuch fund. Eric made a motion and Cathy made a second to approve the September 2016 meeting minutes, as amended. Unanimous.

Current Financials: MGWAF fund balance is \$189,525.04 as of 12/01/2016. This includes \$171,328.81 of restricted (endowment) funds at Affinity Plus and \$18,202.23 of unrestricted (non-endowment) funds at HiWay. There were several credits totaling \$42,743.22 – including \$41,651.74 from MGWA. Debit of \$403.50 for quarterly Wells Fargo Advisors fee. H.O. Pfannkuch fund is \$30,647.47. No debits and \$240 in credits for H.O.P. Cathy provided an update on the investment portfolio: Apple, GM, 3M, utilities, S&P 500, Exchange Traded Fund (ETF). Performance is 0.08%. Our advisor recommends moving the endowment and unrestricted funds to the WF Advisors account. The H.O.P. fund stays at Affinity because WF investment accounts have a \$50,000 minimum. If MGWA allocates enough of their next transfer to the HOP fund the balance could reach \$50,000. Lanya will bring the request to MGWA at their December meeting. Cathy asked for Board authorization to carry out the advisor's recommendations. Eric seconded. Unanimous.

The MGWAF endowment is over \$100,000 and interest can now be moved into unrestricted funds. Under the terms of MGWA's donations to MGWAF, money should not be taken from the principal. MGWA has donated unrestricted funds in order to get some additional field camp scholarships going. MGWA pays the administrative costs of MGWAF so that all donations go to the Foundation's charitable purposes. The WF fee will also be paid by MGWA. Cathy and Stu will connect with WF about: 1) tracking endowment vs. non-restricted funds, 2) how management fees are debited, 3) moving gains to unrestricted funds.

New Business: Grant Applications
McCray East Parents Club: \$1,000 Science Museum show. Eric made a motion, Lanya seconded, to approve the McCray East Parents Club application for \$1000, educational presentation by the Science Museum of Minnesota to elementary students regarding clean drinking water and water conservation. Unanimous.
Red Lake SWCD: \$1,000 request, 8 county area. Cathy made a motion, Lanya seconded, to approve the Red Lake Soil and Water Conservation District application for \$1,000 to support the Northwest Minnesota Water Festival. Unanimous.
Reports from Scholarship Recipients: Stephanie asked about reports, there was discussion about timing an annual report for the September newsletter. Grant recipients are asked to report back on their events and put something together for that newsletter. Lanya will draft template cover letter for scholarship recipients, asking them to share results/article, send to MGWA office email.
Scholarship Policy for Hydrocamp Award Discussion of HO Pfannkuch award application: What does the award cover? Which field camps are eligible? What is an appropriate award amount? The schedule for approval was discussed with the goal of announcing the award at the MGWA Spring Conference. Lanya made a motion to fund two (2) HO Pfannkuch Field Camp Awards in the amount of \$1,500 each (\$3,000 total), to be funded through MGWA Foundation unrestricted funds, \$2,000 of which had previously been provided by MGWA for this purpose. Eric seconded. Unanimous.
Annual Student Scholarship The student scholarship announcement is on the website and was shared with MGWA membership by email.
Exhibitors The MGWA Fall Conference has five (5) exhibitors, thanks to Cathy's effective outreach.
New Director Lanya volunteered to serve as a MGWA Foundation Director, to fill a current vacancy on the Board.

Electronic Actions After the meeting, on January 20, 2017, Cathy made a motion to approve the following resolution:
1) For the MGWAF treasurer and authorized user (J. Leete) to close out the HiWay Federal Credit Union accounts currently totaling \$16,186.20 and the Affinity Plus MGWAF accounts currently totaling \$63,553.62 and roll the funds over to the Wells Fargo Advisors account.
2) Keep the Affinity Plus HOP account currently totaling \$30,640.60 as is.
3) For the MGWAF treasurer and authorized user (J. Leete) to authorize Wells Fargo Advisors to create a checking account (that will have no fees or no maximum check issuance requirements) so that Wells Fargo Advisors may write checks for such items as scholarships, grants, water funds, and any other MGWAF approved activities. The MGWAF treasurer and authorized user (J. Leete) would inform Wells Fargo Advisors about pending check requests via e-mail. Seconded by Lanya. All in favor. Motion passed.

MGWA BOARD MINUTES

Meeting Date: Tuesday, December 13, 2016

Location: Fresh Grounds Café, 1362 West 7th Street, St. Paul, MN

Attendance: Ole Olmanson, President; Evan Christianson, President-Elect; Emily Berquist, Treasurer; Andrew Retzler, Secretary

Agenda: Approved with addition of Spring Conference ideas.

Past Minutes: Approved with revisions.

Newsletter: No updates. Everything in order for December newsletter.

Web Page: Olmanson will begin transitioning the old web page materials to the new site.

Treasury: Berquist discussed the Treasury Report with the Board. The total income for the period of January 1, 2016 – December 7, 2016 is \$111,593.59; total assets for this period are \$113, 101.44. Net income from January 1, 2016 – December 7, 2016 is \$36,422.51. The total income from the 2016 Fall Conference fees is \$44,190.01.

WRI Report: No updates.

MGWAF Report: Olmanson reported that the MGWAF is looking for MGWA to transfer more funds into their accounts. This will be discussed further at the next MGWA meeting. The next MGWAF meeting is on March 23, 2016.

Old Business: White Paper: The Board discussed the most recent revision to the Groundwater Education White Paper. Olmanson found a few minor errors that will be passed along to the committee. The Board agrees with the revisions to the figures and the cover artwork. Christianson motions to approve the final version of the Groundwater Education White Paper. Berquist seconds – motion passes. The Board expects the Groundwater Education White Paper details will be included in the upcoming newsletter. The Board discussed the idea of an Education Committee, as suggested by the White Paper workgroup and mentioned during the Fall Conference. Olmanson plans to talk to Jeff Stoner regarding how many members may be interested in participating in said committee.

Fall Conference Analysis: The Board reviewed Fall Conference attendee's comments regarding the meeting. Present Board members agree that we could consider new dining options for the conference meetings, and possibly new ways of scheduling lunch and addressing long lines. Olmanson suggests looking into attendee projections and what maximum attendance is. The Board also discussed the possibility of exploring new conference venues, adjusting conference registration prices, revising the registration and refund procedures for student attendees, and streamlining the check-in procedure. Olmanson also suggests the Board consider not charging conference presenters the registration fee.

New Business: Future Spring/Fall Conference Topics: Christianson discussed with the Board his ideas on the upcoming 2017 Spring and Fall Conferences. Presently, Christianson would like to have a Spring Conference possibly focused on "big data" and updates on the current state of databases and mapping/modeling procedures by state agencies and others. Retzler suggested that someone from the MGS could speak on our latest sand modelling efforts, and possibly on recent updates to several databases that the MGS contributes to or manages. For the Fall Conference, Christianson would like to explore the relationship between groundwater and agriculture in tandem with the current White Paper regarding groundwater and drain tiling. Retzler recommended contacting Kevin Kuehner from MDA as a potential speaker regarding his work with the field-to-stream project in the Root River watershed. Christianson says he had registered the MGWA for the Darcy lecture series.

MGWA Social Coordinator: The Board discussed the idea of having an official Social Coordinator to help manage outreach opportunities, MGWA Social Hour events, and to foster interest within the undergraduate/graduate geology and hydrology programs across the state. Berquist is interested in taking this role, and discussed with the Board her ideas on the position and her goals – such as an MGWA Facebook page, long-term scheduling of Social Hours, and field trip opportunities for members. Olmanson recommends that Berquist write up a description of this position and its' possible title for the Board to review in the future.

MGWA Membership: The Board reviewed the latest membership numbers. For the 2017 year, there are currently 306 paid members – 4 students, 25 retired, 258 professionals, and 19 sustaining.

MGWA 2016 Membership Dues

Sustaining Member	\$65
Professional Member:	\$45
Retired Member	\$25
Full-time Student Member	\$20
Newsletter (printed and mailed)	\$20

Membership dues rates were revised at the July 1, 2015 meeting of the MGWA Board.



*Environmental Concepts &
Design, Inc.*

**Celebrates 20 year
Anniversary**

1996-2016

**St. Paul & Walker, MN
1-800-709-5263**

www.ecadEngineering.com

MGWA BOARD MINUTES

Meeting Date: Tuesday, January 17, 2017

The MGWA Board meets once a month, currently over lunch, on the second Tuesday at Fresh Grounds on W 7th Street in St. Paul.

Members are welcome to attend and observe

Location:	Fresh Grounds Café, 1362 West 7th Street, St. Paul, MN
Attendance:	Evan Christianson, President; Ellen Considine, President-Elect; Ole Olmanson, Past-President; Anneka Munsell, Treasurer; Andrew Retzler, Secretary; Jeanette Leete, WRI; Sean Hunt, WRI; Tedd Ronning, Newsletter Editor; Emily Berquist
Past Minutes:	Approved
New Members:	The Board formally recognized and welcomed its' newest members, Ellen Considine (President-Elect) and Anneka Munsell (Treasurer).
Newsletter:	The December newsletter has been sent out to membership. Ronning said Christianson should have a President's note compiled by the first week in February for the next newsletter. The Board discussed new ways to approach the newsletter, including featured articles or snippets available publically on the website. Olmanson stated this approach can be easily set-up through the new website content management system.
Web Page:	Hunt reported that an email went out to membership and that the website has been updated regarding the 2017 MGWAF student scholarships. Olmanson would like to begin transferring the old website content to the new system, with the goal of having the transition completed prior to the Spring Conference registration period.
Treasury:	Leete informed the Board that the 2017 funds have yet to be transferred from the 2016 year, and therefore do not show on the profit & loss books. An updated, more complete reporting of our accounts can be expected at the next Board meeting. Leete is still waiting to transfer the \$40,000 from MGWA into the MGWAF account.
WRI Report:	Hunt updated the Board on membership numbers – 347 renewals with 6 students, 27 retirees, 292 professionals, and 22 sustaining members. Hunt will send out another email notice for membership renewals, and more paper renewal notices in February. The Board discussed possible trends in the membership numbers, and will re-look at the numbers post-Spring Conference to see if there is any reason for concern.
MGWAF Report:	Olmanson will attend the meeting in March. Hunt attended the December meeting and updated the Board – one funding request handed out, and another new request came in.
Old Business:	<u>Spring Conference</u> : The Board discussed ideas for the upcoming Spring Conference. Christianson would like to have the conference revolve loosely around the topic of big data and analyses, as well as include a modelling aspect. Christianson revisited the idea of a panel discussion led by members of the various state agencies who can speak on behalf of their respective databases. The Board liked this idea, and thought many of these state agencies could also have presentations prior to the panel discussion that updated conference attendees on the data they currently have on-hand and the new and innovative ways they are putting these data to use. Christianson told the Board about an online software, Pigeonhole, which allows attendees to submit questions via text that can then be monitored and moderated to a panel. The possible agencies to have represented include DNR, MGS, MDA, MnDOT, MDH, and MPCA. Berquist will look into possible speakers and noteworthy datasets at the MDH and Retzler will do the same at the MGS. Olmanson recommended trying to incorporate some aspect of ethics within one of the presentations. Considine put together a working Spring Conference outline based on the discussion.
Education Committee:	The Board discussed what function the past MGWA Education Committee had and how the revamped committee should function. The old committee was focused on educating K-12 youth about groundwater science. Olmanson contacted Jeff Stoner regarding the list of MGWA members interested in participating in a new committee. Olmanson will update the Board on what he hears at the next meeting. Considine discussed the ideas that the Education White Paper Committee had for the role of said committee. Olmanson shared his thoughts on the current trend of technology-based education and that we should possibly hire someone to help create up-to-date web- and app-based learning modules. Christianson mentioned Karlene French's name, and that she has experience with this aspect. The Board would like to host a meeting with French to discuss this idea, as well as a meeting with those interested in volunteering for the Education Committee before any further decisions are made.
New Business:	<u>Social Events</u> : Berquist shared her thoughts on future social event planning, along with the idea of visiting the geology clubs of various near by colleges and universities to advertise such events. Olmanson suggested preparing a short write-up for the newsletter informing membership of Berquist's new role in the organization. Retzler recommended looking at the recent AIPG social hour event emails as an example for planning MGWA events. Berquist would like to get the MGWA Facebook page up and running.

Save These Dates

2017 MGWA Conferences

4/26/2017

11/15/2017

DISCOUNT FOR MGWA MEMBERS



Emerging Techniques in Hydraulic Testing for Fractured Rock

April 27, 2017

Analysis of Single-Hole Hydraulic Testing in Fractured Rocks and Its Implications

May 4, 2017

Analysis of Pumping Tests in Fractured Rock with Traditional Interpretation Methods

May 11, 2017

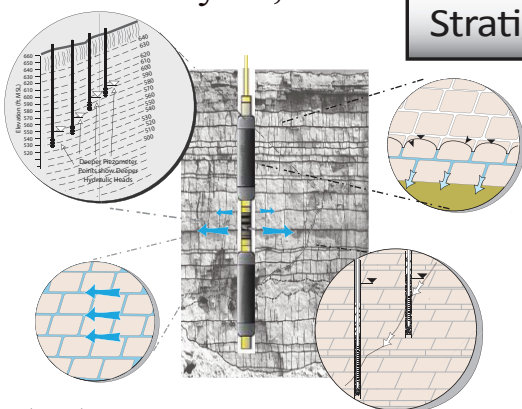
Novel Analysis of Pumping Tests Using Hydraulic Tomography

May 18, 2017

Transducer Technologies From Measuring Water Levels to Exporting Data

May 25, 2017

Borehole Flow Meters for Assessing Bedrock Stratigraphy and Fracture Hydraulics



Midwest GeoSciences Group & In-Situ, Inc. have designed a powerful five-module webinar series dedicated to hydraulic testing fractured rock.

Webinar Completion Certificates
Are Available From:



7.5 CONTACT HOURS
for the entire series

Unlimited Participants Per Registration Site
(Terms & Conditions Apply)

\$99 per module

\$495 when registering for the entire series
before April 15, 2017

using Promo Code: **MGWA-aquifer100off**
(\$299 registering for only one module)

Instructors:

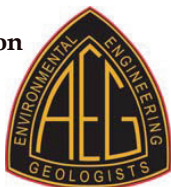
Walter Illman, PhD, University of Waterloo

David J. Hart, PhD, Wisconsin Geological and Natural History Survey

Jenny Mann, In-Situ, Inc.

Register Now: www.midwestgeo.com

In
collaboration
with:



Live & Interactive On-Line

EDUCATION & TRAINING
Professional Webinar Series



Improve Expertise Gain a Competitive Advantage Enhance Efficiency

DAKOTA TECHNOLOGIES

HIGH RESOLUTION SITE CHARACTERIZATION SPECIALISTS

Dakota Technologies provides state-of-the-art services for hazardous waste site investigations, specializing in the rapid site assessment of subsurface LNAPL and DNAPL.



Our rapidly growing fleet of equipment includes **11 UVOST** and **5 TarGOST** units, along with **multiple MIP, HPT** and **combination LIF-HP** units. Our team of expert operators is ready to mobilize **nationwide** to meet all of your time-critical project needs.

Dakota's HRSC Services Include:

◀ **UVOST® & UVOST-HP**
Petroleum LNAPL screening
Hydrostratigraphic profiling

◀ **TarGOST® & TarGOST-HP**
Coal tar and creosote screening
Hydrostratigraphic profiling

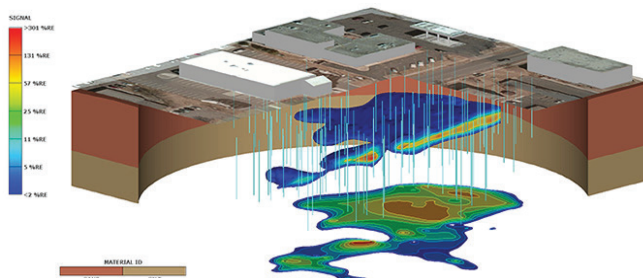
◀ **DyeLIF™**
Chlorinated DNAPL screening
Hydrostratigraphic profiling

◀ **Membrane Interface Probe & MiHpt**
VOC screening & hydrostratigraphic profiling

◀ **Hydraulic Profiling Tool**
Hydrostratigraphic profiling

◀ **Advanced Data Analysis**
Maximize LIF data value

◀ **Data Visualization**
2D & 3D Conceptual site models



www.dakotatechnologies.com
info@dakotatechnologies.com
701.237.4908

Maple Grove, MN | Morris, MN | Kansas City, MO | Fargo, ND | Columbus, OH | Charleston, SC